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## A mobile-based learning tool to improve writing skills of efl learners

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### Abstract

Recent pervasiveness of mobile computing becomes an attractive motivation for EFL learners. Korea provides an excellent environment for using mobile devices such as smartphones and tablet PCs, with easy access to wireless networks. This offers the learners a chance to practice writing on-the-move. This paper introduces a design of a mobile-based tool to assist the learners of beginning to intermediate levels in improving English writing skills. It provides two types of learning mode: 1) the learners select grammatical categories for which the tool provides a brief description and exercise questions, and 2) they choose one of the suggested Korean sentences and write a corresponding English sentence to be evaluated and provided with instructional feedback.

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### 1. Introduction

Wireless communication technology is rapidly growing and has produced advanced computing devices which are still evolving. The devices present high capabilities from which human life greatly benefits. Korea provides an excellent environment for using mobile devices such as smartphones and tablet PCs since a variety of devices is easily accessible. Those hand-held devices along with easy and widespread access to wireless networks have changed the future of e-learning (Godwin-Jones, 2011). Mobile-based language learning in particular is recognized as a potential and convenient way as extension to currently existing methods because it is spontaneous

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and ubiquitous. Since mobile-based language learning also offers an opportunity for learners to practice language on-the-move, it can be an ideal solution to overcome time and place related barriers for language learning process.

Enthusiasm on learning English in Korea is beyond what is considered necessary throughout the nation. In particular, the students at grade school and high school pursue intense learning process to survive from excessive competition. They are sent to a cramming school or taking private tutoring after class. Moreover, learning through internet has become very popular among English learners because it allows them to access anytime and anywhere internet connection is available. This kind of convenience together with zeal for learning English has now moved onto mobile devices which can substitute PCs in many aspects. Moreover, those devices are accessible to majority of the learners including even grade school students who are adept in using them. Using mobile devices seems greatly effective in that the learners can utilize them for language learning when they are away from PCs even with a limited amount of spare time.

In this paper, we describe a mobile-based English learning tool that is designed to assist Korean EFL learners in improving their writing skills. They can utilize two types of learning modes the tool provides: grammar review and writing practice. Adopting automated assessment including short answer grading (Mohler et al, 2009), both learning modes evaluate learners' linguistic knowledge which does not require an instructor or tutor. With grammar review mode, they can review or learn about the grammar by selecting grammar categories or features the tool offers. Each category provides with its brief explanation including relevant examples and with a set of multiple choice exercises with which their grammar knowledge is evaluated by the tool. The result is passed onto the next learning mode, writing practice, where the information of the evaluation result is used to suggest an appropriate level of exercises for the learners. With writing practice mode, they can actually compose a corresponding English sentence to a Korean sentence which is automatically suggested based on the evaluation result from the previous mode, or which they select based on their interest. Each Korean sentence is carefully prepared for the learners to be exposed to various grammatical structures and English expressions including contextual synonyms, and to study English grammar according to grammatical categories. With this module, the tool takes a learner's English sentence and checks whether it is grammatical. If it detects an error, it provides instructional feedback regarding 1) the position of the error where it has occurred in the sentence, 2) the grammatical category the error is link to, and 3) supplementary explanations including relevant examples if necessary.

## **2. Error Analysis of English Writings Created by EFL Learners**

Recent trends of error analysis seem to focus on studying learners' output. Analyzing the corpus of learners' actual writing samples can provide a fairly good idea of the learners in terms of their competence and performance since it examines both erroneous and non-erroneous forms of language. The result of analyzing the errors in particular is a valuable source of information since it presents the transitional state of the learners' weakness as well as competence.

Learners' writing samples are used for identifying errors which are then classified based on grammar categories or features. The data used for this research is a collection of English sentences created by junior high school students. For a general error analysis, the errors occurring in writing data are examined in terms of grammar and rhetoric. However, only grammatical errors are considered since the unit of writing is a sentence which is assumed to be reasonable as an input to mobile devices. The analysis results are used to write a set of error-detecting rules implemented in the tool.

### *2.1. Grammatical Category & Error Analysis*

The grammatical categories that the tool provides are selected in order to assist learners for improving their English writing skills. Most of the categories were the ones described in English textbooks authorized by

Ministry of Education. The rest were chosen by consulting reference grammar books popular to Korean EFL learners. A learner selects a category or feature to review or learn about its linguistic nature and its usages. Classification of grammar categories is resentence in Table 1.

Table 1. Grammatical Category

Grammar Category/Feature	Subcategory
Agreement	Subject/Verb Determiner/Noun
Aspect	Perfective Progressive
Comparison	Comparative Superlative
Inflection	Inflections according to POS
Mood	Types of Mood Types of Sentences/Clauses
Noun Plural Formation	Regular vs. Irregular Count vs. Non-count
Spelling	Orthography of Words
Tense	Types of Tense
Voice	Active Passive
Word order	SVO vs. SOV

These categories are also utilized at the writing practice mode with which the learner can actually compose an English sentence for a Korean sentence. The tool provides two options for selecting a Korean sentence. The first option is to choose a Korean sentence from a list suggested by the system which remembers the learner's choices of grammar categories from grammar review. The second is for the learner to choose a grammar category by which the system also lists Korean sentences. Each Korean sentence is prepared to imply a specific grammar category.

The grammatical categories and features presented in Table 1 are also used to capture the errors created by Korean EFL learners. The errors present the characteristics of interlanguage which refers to a learner's developing L2 knowledge (Selinker, 1972). Interlanguage reflects linguistic properties of L1, Korean in this case and the characteristics of L2, English. Among the error types found in L2, our data present overgeneralization and interference/simplification. Overgeneralization errors refer to the ones caused by a rule in which it does not fit to describe a grammatical category. This type of errors was most commonly found from our data. The following examples present the errors of this type.

- 1a) *They studys very hard.*
- 1b) *My mother buyed a nice clothes for me.*

The underlined in 1a) and 1b) indicate regular inflectional morphemes representing present and past tense, respectively. The verb in 1a) is a regular verb, but it requires an orthographic variation when the tense morpheme is attached. The verb in 1b) is an irregular verb whose inflected forms cannot be generalized by a rule. However, it is attached with a tense morpheme which is supposed to be applied to a regular verb. In both cases, the learners overly generalized the rules, which resulted in an error although they provide evidence of developing knowledge regarding a systematic aspect of English.

Interference errors show the influence of L1. Many of the errors found in our data displays linguistic properties of Korean.

2a) *He angry.*

2b) *My favorite is China food.*

2c) *She love her family more than anyone.*

Example 2a) presents an incomplete English sentence reflecting one of the Korean sentence structures where an adjective can form a predicate without a linking verb. The expression “*China food*” in 2b) shows an inflectional error. When the corresponding Korean word for “*China*” becomes a modifier to a noun, no additional morpheme is attached. Example 2c) presents subject-verb agreement violation which does not exist in Korean except honorific. It is not only an interference error, but also considered as an error caused by simplification which produces a verb with the same form regardless of its context, person, number or tense.

## 2.2. Error Handling

Learner’s sentences are sent to the system on the server for automatic scoring. The types of grammatical errors detected by the automated system are categorized into three classes; 1) morphology, 2) syntax, and 3) content. These categories are further classified into various types of errors according to grammatical categories: 6 types for morphology, 28 types for syntax and 4 types for content. A morphological analyzer implemented in the system detects lexical errors by checking inflected forms and orthography of each word. Syntactic errors are identified by a syntactic parser utilizing grammatical categories described in 2.1, which focuses on agreement, word order, constituency, and usage among many others. Content errors are different from what is usually used as one of evaluation criteria for essay scoring since the scopes of detecting errors are different; this research focuses on the sentence level rather than a paragraph or higher levels. These errors are identified by comparing learners’ sentences with their corresponding correct answers which are provided by EFL teachers and verified by native speakers of English. The errors of this category are detected by comparing the following:

- 1) the tense implied in the answer
- 2) the expressions omitted from the learner’s writing
- 3) the expressions unnecessarily added or irrelevant to the answer
- 4) contextual synonyms of a word

The system is implemented with two types of grammar rules. One of them is to parse grammatical sentences while the other one is to analyze ungrammatical sentences including various types of errors. The latter is known as mal-rules which are designed to diagnose grammatical errors (Lee, Choi and Kim, 2011). In other words, these error detecting rules identifies not only an error but also its type according to error classification described above. The type of an error is one of the resources to produce feedback when the tool detects an error. When the error detecting process is completed, the tool provides instructional feedback regarding the error; utilizing the information in relation to where it occurs and what type it is. The feedback also includes a brief description of the error and an explanation of the grammatical category related to the error, and relevant examples when necessary.

The instructional feedback is of great benefit to the learners who spare their time for improving their writing skills on-the-move.

### 3. Mobile-based English Learning Tool

The errors are divided into systematic and non-systematic errors. The systematic errors can easily be described using a set of rules whereas non-systematic ones are usually categorized as idiosyncratic and cannot be generalized. The systematic errors are described using a set of mal-rules. These error-detecting rules are designed to capture not only predictable grammatical errors, but also the errors mostly created by Korean EFL learners because of the influence of L1.

#### 3.1. System Overview

A mobile device is equipped only with a user interface. The actual system including error checking modules and the database is implemented in a server. The Fig. 1 below presents an overview of the overall processing.

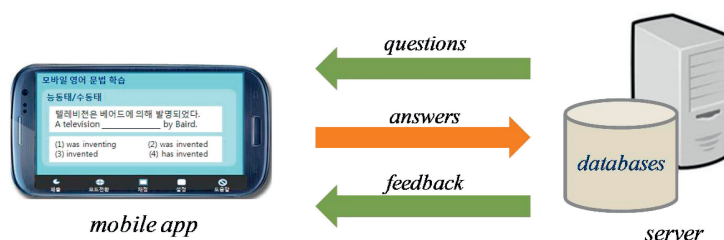


Fig. 1. The overall procedure

When a learner activates the app installed in a mobile device, the server provides all the data including the information of the learner and questions and corresponding correct answers to be provided by both learning modes, grammar review and writing practice. The learner answers a question using the interface provided by the app which sends the answer to the server. The tool residing at the server evaluates the answer. The graded result including the feedback will be provided back to the learner through the app. Exchanging the data between the app and the server is performed in the format of JSON.

The system maintains three type of database containing the information on a learner and questions. Table 2 below shows the information of a learner to be stored in the database.

Table 2. Database for learner information

Category	Description
(1) UserID	
(2) Writing Level	determined based on the evaluation results
(3) A list of Question ID	assigned by grammar review & writing practice after answering the questions
(4) Scores corresponding to each grammatical categories	provided separately by grammar review & writing practice

The database including questions is divided into two according to the learning modes which utilize different types of questions. Table 2 below presents the information provided by the grammar review mode.

Table 3. Database for the information of a question offered by grammar review mode

Category
(1) Question ID
(2) Grammatical category
(3) Question
(4) Answer
(5) Explanation
(6) Difficulty Level

Grammar review mode provides a question selected by learners according to their interests. The question type is a multiple choice from which the learners select a number of their choice. Each question is assigned with its ID and is specified with its relevant grammatical category and the degree of difficulty. In addition, the question is linked with its correct answer and a brief explanation. The system stores the learners' choice of questions and its evaluated score.

A different type of question is provided by writing practice mode. The information linked to a question is presented with the Table 4.

Table 4. Database for the information of a question offered by writing practice mode

Category
(1) Question ID
(2) Question
(3) A set of correct answers & a synonym list
(4) Difficulty Level

Writing practice mode offers a Korean sentence as a question assigned with its ID. The question is linked to a set of correct answers and its corresponding grammatical categories. The questions present higher degree of difficulty than those provided by grammar review mode. When the learners proceed to writing practice mode, it initially suggests a question which is assumed to be most helpful for the learners, based on the information passed from grammar review mode. The information includes the following; 1) a question which may complement the problems the learners has encountered at grammar review mode and 2) a question whose grammatical category has not been studied by the learners. When the learners complete the practice, the tool provides the automatically processed result which includes the total score, the writing level mapped to the score and instructional feedback. As the last step of the process, the database storing the information of the learner is updated with the latest result.

### 3.2. App Interface

The design of user interface for the app is completed and will be implemented with further work. When the app is activated with login, the tool provides the learners with the evaluation result stored from the previous exercises, as displayed in the image (a) below. From the same page, there is an option to choose a type of a learning mode between grammar review and writing practice. When grammar review mode is selected, they can choose a grammatical category for a review. They are also offered with a question of a multiple choice from which they select a number of their choice as an answer. The system, then, grades the answer and provides the grading result with feedback, as shown in the image (c) and (d).

If writing practice mode is selected, the tool offers a Korean sentence which is considered most beneficial to the learners based on the result passed from grammar review mode. When they complete writing a corresponding English sentence, the system scores the sentence. The learners are provided with the automatically scored result with appropriate feedback. This process is presented with the image (e) and (f). When the learners complete the

practice, the tool provides their proficiency of each grammatical category they have studied. The proficiency is displayed using a graph, as shown in the image (b). The score to be stored in the database is calculated in consideration of the degree of difficulty assigned to the question.

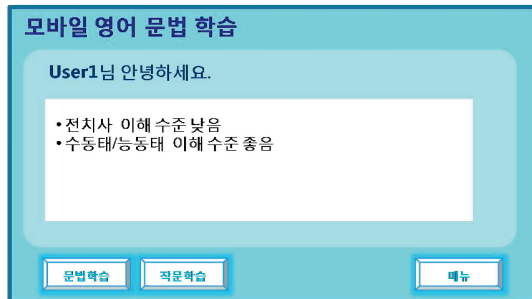


Figure 2. (a)



Figure 2. (b)

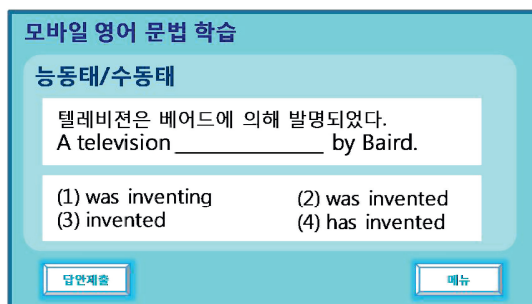


Figure 2. (c)

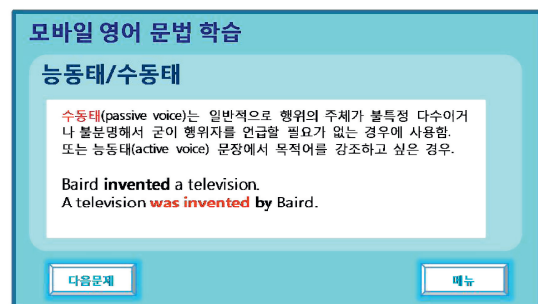


Figure 2. (d)

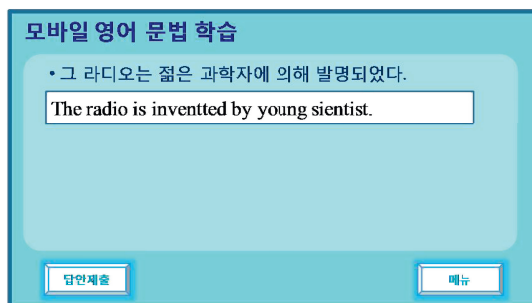


Figure 2. (e)



Figure 2. (f)

#### 4. Conclusion

This paper has presented a mobile-base English learning tool that is designed to improve writing skills of Korean EFL learners. The tool provides two different learning modes, by each of which the learners can benefit even when they are on-the-move. These two learning modes interact each other through database where the information of learners and the results of each mode are stored. With grammar review mode, they can learn about various grammatical categories of English through answering a question related to the category of their interest. The result is passed onto writing practice mode where the learners are suggested with a question considered most

helpful for them according to the result. The answer sentence composed by the learners is automatically processed to produce the result which includes the information on the errors detected if any and instructional feedback. When they complete the practice, they are provided with the total score and the level of proficiency of each grammatical category that they have studied. Considering the popularity of mobile devices and their easy accessibility, learners can benefit greatly from utilizing the convenience provided the tool.

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